

Stinks and bangs: the heyday of the chemistry set

Rosanne DiVernieri

Chemical Heritage Foundation, 315 Chestnut Street, Philadelphia, PA 19106, USA

When you hear the phrase ‘chemistry set’, what is the first image that pops into your head? Is it one of a mad scientist in a dark laboratory full of pieces of glassware bubbling over? Is it your high school or college chemistry lab? For many, the phrase evokes a time of exploration and experimentation, a time where a child could be and do anything they could imagine. Although first and foremost to be a toy providing hours of entertainment, chemistry sets also allowed children to interact intimately with science. It is these interactions that led many to go on to become famous chemists and physicists. By studying these sets – their content, the imagery surrounding them and the people that used them – we can hopefully better understand how society viewed, and continues to view, science.

Old chests

The first recorded mention of a chemical or portable chest is in 1791 in a text entitled, *Description of a Portable Chest of Chemistry or a Complete Collection of Chemical Tests* by Goettling [1]. Originally printed in German, this text, and

by extrapolation the chests, were for use by chemists, physicians, mineralogists, metallurgists, scientific artists, manufacturers, farmers and the cultivators of natural philosophy. Goettling went into great detail describing his chest, noting the number and contents of each drawer, as well as the overall size and composition of the chest. The tests or experiments he listed were very basic and aimed to give a firm chemical foundation for those studying science. Goettling’s chest could be purchased at the London shop of W. and S. Jones, a quality purveyor of all things scientific.

Just a few years later in 1797, James Woodhouse, a professor of chemistry at the University of Pennsylvania in Philadelphia, put together a similar publication for the United States market [2]. His *Young Chemists Pocket Companion; Connected with a Portable Laboratory*, like Goettling’s text, explained the contents of his chest in detail. The similarities did not end there. The experiments in both publications were almost identical, with a few slight variations in technique and approach. While many would assume that Woodhouse simply copied Goettling, that is not entirely accurate. At this time, there were very few experiments that were simple enough to be put into a



Figure 1. Chemical lectures, contemporary caricature by Thomas Rowlandson. The inscription Surrey Institution on the door frame and the title Accum’s lectures on the dust jacket held by the man sitting on the left under the corner both indicate that this image likely depicts Accum.

book aimed at such a diverse and largely inexperienced audience.

By the beginning of the nineteenth century, both the chests and the experiments contained in the accompanying texts were beginning to get more complex. In *Chemical Amusement* by Accum [3] the number of experiments on offer had doubled, arranged according to the material being tested, with gaseous experiments in one section, water experiments in another and so on. Unlike previous texts, Accum intended this work to be used by students and professionals in chemistry, not just those with a fleeting interest in the subject (Figure 1).

Through the middle of the nineteenth century, chemical chests were produced and marketed by a small number of individuals and shops, selling the same sets to everyone. Starting in the 1860s a new British company – John J. Griffin and Sons – emerged that changed the way the chemical chests would be marketed up until the outbreak of World War I. At its height, Griffin manufactured and sold 11 different categories of cabinet, ranging from simple ones aimed at the merely curious to more advanced, customized varieties for students attending institutions like the Royal Naval College, the Royal Agricultural College, the Universities of Oxford and Cambridge [4] and for the headmasters of elementary schools. The diversity of the Griffin range ensured the company's dominance. In fact, no other 'brand' of chemical chest was as popular as the Griffin sets until the late 1940s with the emergence of Chemcraft and Gilbert.

Chemcraft and Gilbert

The events leading to the outbreak of World War I and increasing instability in Europe had a major impact on the production of chemistry sets. With a high proportion of Europe's raw chemicals being produced in Germany, the onset of hostilities closed off an important source of ingredients for the likes of Griffin. At the same time, domestic production in Britain, such as it was, became almost exclusively channeled into the war effort.

In 1914, just as these pressures were beginning to tell in Europe, a small company – the Porter Chemical Company – was born in Hagerstown, an industrial hub in Maryland in the United States. The company's stated goal was to make and sell 'chemical preparations and other materials and articles' and its founders – brothers John J. Porter and Harold Mitchell Porter – decided to concentrate on the production of chemistry sets [5]. These, they reasoned, would be relatively simple to manufacture and would be one of very few intellectually stimulating toys then on the US market.

Mainly focusing on the mid-Atlantic cities of Philadelphia, Baltimore and Washington, D.C., the first of Porter's Chemcraft sets hit department-store shelves in 1915. Working at first with small toy shops, Porter sets quickly gained popularity in the local markets and the sets soon found their ways onto the shelves of places like Woolworths and Strawbridge and Clothiers. Between World War I and World War II, Porter continued to expand its market to include more of the Eastern United States. At first, the



Figure 2. Chemcraft. The chemical outfit. CHF collections. Photography by Gregory Tobias.

Chemcraft line only included two or three types of set with one standard booklet. As their popularity grew, so did the number of sets on offer. In any given year during the 1950s, Porter offered between 10 and 15 different sets that ranged in size (from 10 to 100+ items) and price (from \$1.00 and up).

Then, in 1920, a rival to Porter – the A.C. Gilbert Company – emerged onto the chemistry set scene. Alfred Carlton Gilbert, inventor of the hugely popular Erector Set, began marketing simple microscope sets and Chemical Magic sets. These first sets included instructions on how to put on your own ‘magic’ shows using the experiments and chemicals provided in the sets, including details of how to set up the stage and how to dress. The idea that chemistry and chemical reactions could be passed off as magic was not new. People were, and to some extent still are, fascinated when a change occurs right before their eyes. Shrinking, melting, changing colors and disappearing are all effects of scientific experiments that can be used to amuse, although the scientists will be the first to tell you that it is not magic, that the explanation is quite simple.

Over the course of the next 30 years, these two companies competed for the expanding market; they were rivals in every sense of the word. They competed for buyers and advertising space, usually in comic books, Popular Science magazine and other publications aimed at children. The two companies even competed in the designs of the sets, each not wanting to be too similar to the other and each wanting to be more colorful and eye-catching. After World War II, Porter and Gilbert were joined by the likes of Skil-Craft, Handy-Andy and Midget Lab, new companies intent on capitalizing from the increasing popularity of this toy. In spite of these newcomers, however, Porter and Gilbert remained dominant, with Skil-Craft coming in a distant third. Billed as the perfect birthday or Christmas gift, a chemistry set promised magic for its user and, at least in the minds of his parents, a potential career. Staring out from the covers of strikingly colored boxes were smart-looking, well-dressed young boys, exuding the confidence that the field of chemistry was feeling at the time (Figure 2). By the mid-1950s, the height of chemistry sets’ popularity in the United States, there was hardly a boy in the country who did not own or want one. In fact, there was a popular advertising slogan that there was a chemistry set in every house on every street in suburban America.

Windows onto a different world

Such images provide an intriguing glimpse into the mind-set towards education and science in postwar America. The figures on the covers and in the advertisements were well groomed, intelligent and obviously successful, representing the boom in the American chemical companies, such as Dow and DuPont, and the expansion of other scientific fields like physics. The Chemcraft corporate slogan at this time, ‘Experimenter Today... Scientist Tomorrow’, was the essence of the time.

Organizations such as the Boy Scouts of America began promoting the sciences; nature and botany had always be important activities for the organization, but they began to introduce topics like optics and engineering. This was also the time when US television began to feature ‘educational

programming’, notably *Watch Mr. Wizard*, which ran in 1951 until 1965 and is still considered to be one of the most popular children’s series ever broadcast in America. Mr. Wizard would conduct experiments that could be easily recreated at home while introducing different scientific topics to thousands of viewers. This was a time of excitement about the potential of science, an environment that fed an entire generation of chemists (Figure 3).

By the late 1950s, however, the attitude towards chemistry and science in general had started to change. Being a scientist was no longer enough. With the dawn of the nuclear age and the race for space, there were big issues that needed big solutions and people began to expect more



Figure 3. Explosive lesson. Don Herbert and an unidentified boy conduct an experiment on the TV series *Watch Mr. Wizard*, circa 1955. NBC Television/Getty Images.

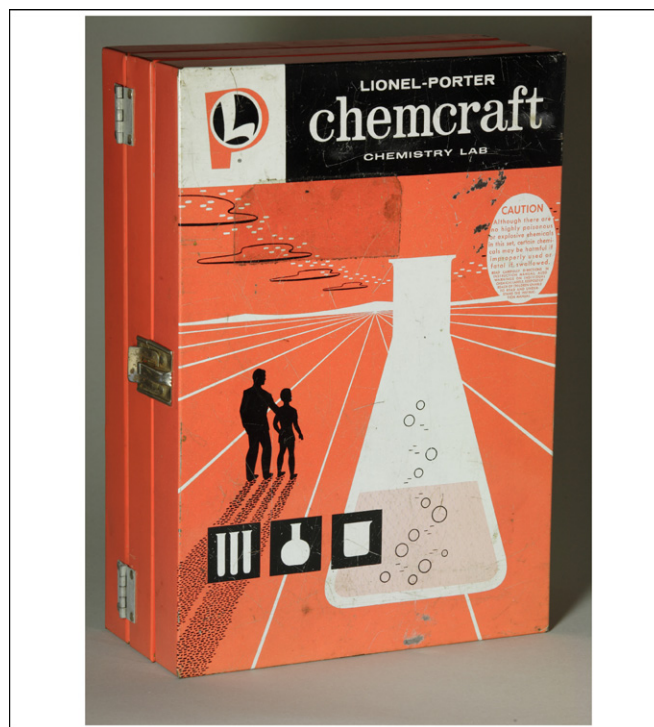


Figure 4. 1960s futuristic cover image without boy. CHF Collections. Photography by Gregory Tobias.



Figure 5. Lab technician's set for girls. CHF Collections. Photography by Gregory Tobias.

of chemistry and science. In order to stay on top, children needed a grounding in complicated topics like fusion/fission and even quantum mechanics. The more abstract box images and Chemcraft's slogan at this period – 'Porter Science Prepares Young America for World Leadership' – capture this shift nicely (Figure 4).

At around this time, girls began to get a look-in on the covers of chemistry sets, with some companies starting to manufacture sets specifically for aspiring female chemists. This was still the 1950s, however, so these were usually entitled 'Lab Technician', were frequently pink and contained little more than a plastic microscope, some samples and a manual (Figure 5).

Gradual decline

By the time such gender stereotypes had become less pronounced, the heyday of the chemistry set was well and truly over. By the 1960s, increasing concerns over safety had resulted in many toys being deemed too dangerous to children. Parents were no longer sure they wanted their children playing with loose chemicals or attempting to bend glass tubing with an alcohol lamp in the basement. Finally, government regulation of chemicals fundamen-

tally changed the makeup of chemistry sets and therefore limited the experiments possible [6]. Experiment books that were once 100 pages were diminished to 25–30 pages of simple, routine, 'safe' experiments. Once thriving companies like Gilbert and Porter went out of business.

Another reason for the decline in the chemistry set is that there was a change in the way the American public viewed science and chemistry specifically. Rachel Carson had published *Silent Spring* and made the world aware of the prevalence of pesticides, air pollution was becoming a concern in cities like Los Angeles and New York, and the world was still coping with the effects of thalidomide. Consequently, there were negative associations with the word 'chemical' and the chemistry set began to fade as did most other science sets.

But these educational toys did not disappear entirely. In the late 1980s, with a surge in the public interest in science, they began to re-emerge. Today's sets are smaller, less flashy and have fewer chemicals, if any at all. But they are attracting children back to chemistry using different and more creative ways than ever before. Large institutions like National Geographic, The Smithsonian and Cambridge University all either produce their own branded sets or endorse those produced by others. The draw of Harry Potter, kitchen chemistry and 'grossology' are undeniable from a marketing point of view. The inclusion of computer and web-based components introduced the concept of an interactive chemistry set, something suitable for children of the twenty-first century. Although these sets lack the diversity of materials and do not encourage the same ideas of free experimentation as did their predecessors, these new sets are providing the current generation of children the same opportunities to become interested and invested in science and the field of chemistry.

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